

-Short Communication-

The first record of the African catfish *Clarias gariepinus* (Burchell, 1822) in Puerto Rico

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Abstract: We recorded the occurrence of the African catfish *Clarias gariepinus* in the inland waters of southeastern Puerto Rico for the first time, increasing the number of exotic freshwater fish on the island. Two individuals of *C. gariepinus* were collected in the municipality of Guayama and deposited in a zoology collection. This opportunistic species represents a serious concern due to the reported adverse ecological impact on native ecosystems. The source of the introduction remains unclear, but we suggest the aquarium trade or fish farmers as two potential sources. Further studies are important to control the expansion of *C. gariepinus* in Puerto Rico.

Keywords: new record, exotic species, *Clarias gariepinus*, walking catfish, Puerto Rico

The African catfish *Clarias gariepinus* (Burchell, 1822) is one of the most studied tropical catfish within the genus *Clarias* (Teugels, 1986). The species is native to most of the African continent and small areas of Asia in Israel, Syria, and south of Turkey (Froese and Pauly, 2018). The relationship with humans through fish farming has facilitated the spread of *C. gariepinus* into many countries, significantly expanding its geographical distribution (McKinney and Lockwood, 1999). The African catfish has been introduced in at least 37 countries of Africa, Europe, Asia and America mainly for aquaculture with negative impacts on freshwater and brackish ecosystems (Vitule *et al.*, 2006; Krishnakumar *et al.*, 2011; Weyl *et al.*, 2016). In the Caribbean, the species has been introduced for aquaculture in Cuba (Kubota *et al.*, 2012).

Members of the genus *Clarias* are among the world's worst invasive species (Lowe 2004) and *C. gariepinus* has developed important adaptations for surviving in unsuitable environments with low oxygen levels and long periods of desiccation (Donnelly, 1973; Bruton, 1979). The African catfish can devastate the native aquatic biodiversity, mainly fish and aquatic invertebrate populations (Bruton, 1986). The development of freshwater aquaculture in the past century has played a major role for the introduction of many exotic fish worldwide (Naylor *et al.*, 2001). Here, we confirm the occurrence of *Clarias gariepinus* in southeastern Puerto Rico.

Systematics

Superclass Pisces Linnaeus, 1758
 Class Actinopterygii Klein, 1885
 Order Siluriformes G. Cuvier, 1817
 Family Clariidae Bonaparte, 1846
 Genus *Clarias* Scopoli, 1777
Clarias gariepinus (Burchell, 1822)

Two individuals of *Clarias gariepinus* were collected next to the Patillas Canal in the municipality of Guayama in Puerto Rico ($17^{\circ}58'40.6''N$, $66^{\circ}08'57.6''W$), on October 31 of 2018 (Fig. 1a). The collection site is part of a canalization bridge with a soft muddy substrate (8-11 cm depth) and quite water accumulated over a flat platform of concrete. Freshwater was running slowly with approximately 6-14 cm depth over the muddy substrate, considered its typical habitat (Gutiérrez *et al.*, 2013).

Material examined consisted of two medium-sized individuals, preserved in ethanol 90% and deposited in the Zoology Museum collection of the University of Puerto Rico, Río Piedras Campus. The first organism (MZUPRRP-I-936) measured 122.1 mm total length and 20.2 mm of cranial width. The second organism (MZUPRRP-I-937) measured 135.7 mm total length and 24.4 mm of cranial width. Both individuals are characterized by a narrow snout with a straight lateral outline (in dorsal view) and convex anteriorly. They displayed a posteriorly compressed body and small eyes. The head is depressed, dorsal profile slightly convex, ventral profile is almost straight. The occipital process is pointed and evenly curved. They have an

olive with dark greenish-brown markings on the dorsal surface and pale to white in the ventral surface. Both individuals have four pairs of whiskers and fleshy

papillated lips. There are no dorsal and anal spines (Fig. 1b).

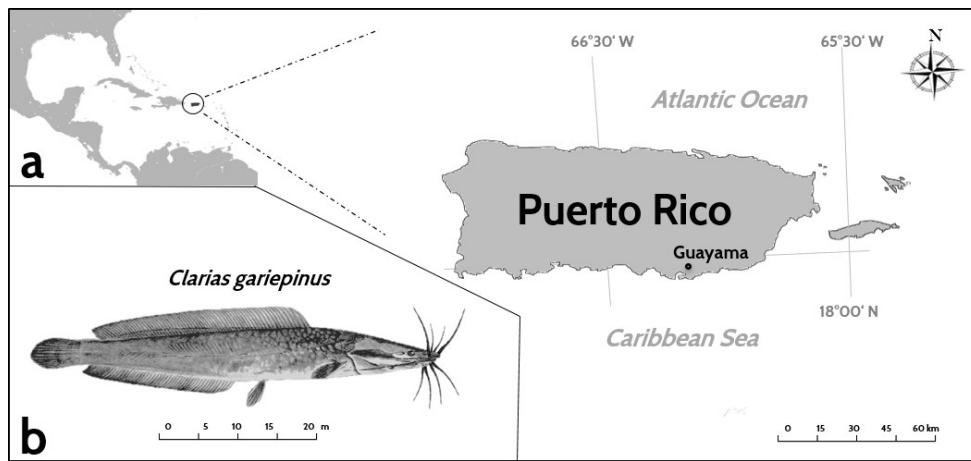


Fig. 1. (a) Locality where the African catfish *Clarias gariepinus* was collected in the inland Puerto Rico.
(b) Lateral view of an individual of *C. gariepinus*.

The introduction pathway of *C. gariepinus* in Puerto Rico remains unclear, but we suspect the two most likely sources as either the aquarium trade or fish farmers. For example, *C. batrachus* was initially imported for the aquarium trade in the 1960s in the State of Florida, and it has been suggested that some individuals were purposefully released by fish farmers in the late 1960s (Nico, 2017). According to the invasion framework (Blackburn *et al.*, 2011), the African catfish has established a wild population in the area of Guayama. Further studies are needed to determine the magnitude of the “spreading phase” of *C. gariepinus*, to establish a management program for controlling its expansion to other inland areas of Puerto Rico, and to evaluate its impact in native fish species like gobiiform, since many of them are not large-sized fishes and are also benthic like *Clarias*.

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